

## CLAIMS

What is claimed is:

- 1        1.     An actuator, comprising:  
2        a stationary guide;  
3        a carriage movable along the guide; and  
4        a piezoelectric motor operatively coupled to the carriage and pushing on the  
5        guide such that the motor when energized moves with the carriage along the guide.
- 1        2.     The actuator of claim 1, wherein the motor comprises a base and a  
2        beam of piezoelectric material attached to the base, the base of the motor connected  
3        to the carriage and a free end of the beam pushing on the guide.
- 1        3.     The actuator of claim 1, wherein the motor is attached to the carriage.
- 1        4.     The actuator of claim 1, wherein the motor is biased against the guide.
- 1        5.     The actuator of claim 1, further comprising a spring coupled between  
2        the carriage and the motor to urge the motor against the guide.
- 1        6.     An actuator, comprising:  
2        a stationary guide;  
3        a piezoelectric motor pushing on the guide; and  
4        a carriage at least partially surrounding the motor and movable back and forth  
5        along the guide at the urging of the motor.
- 1        7.     A head carriage and actuator assembly, comprising:  
2        a stationary guide;  
3        a carriage movable along the guide;  
4        a head carried by the carriage; and  
5        a piezoelectric motor attached to the carriage and pushing on the guide such  
6        that the motor when energized moves with the carriage along the guide.

1           8.     A head carriage and actuator assembly, comprising:  
2           a stationary guide;  
3           a carriage movable along the guide;  
4           a head carried by the carriage; and  
5           a piezoelectric motor attached to the carriage opposite the head such that the  
6 guide lies between the head and the motor, the motor comprising a base attached to  
7 the carriage and a beam of piezoelectric material attached to the base, a free end of  
8 the beam pushing on the guide.

1           9.     A head carriage and actuator assembly for a tape drive, comprising:  
2           a first guide rail;  
3           a second guide rail spaced apart from the first guide rail;  
4           a carriage supported on and movable along the first and second guide rails;  
5           a magnetic head carried by the carriage, the head positioned adjacent to the  
6 first guide rail opposite the second guide rail such that the first guide rail lies between  
7 the head and the second guide rail; and  
8           a piezoelectric motor attached to the carriage and operatively coupled to the  
9 first guide rail such that the motor when energized moves with the carriage along the  
10 guide rails.

1           10.    The actuator of claim 9, wherein the motor comprises a base and a  
2 beam of piezoelectric material attached to the base, the base of the motor attached  
3 to the carriage and a free end of the beam pushing on the first guide rail.

1           11.    The actuator of claim 9, wherein the motor is attached to the carriage  
2 between the first guide rail and the second guide rail.

1           12.    The actuator of claim 9, wherein the carriage surrounds the motor.

1           13.    A head carriage and actuator assembly, comprising:  
2           a stationary guide;  
3           a carriage movable along the guide;  
4           a head carried by the carriage; and

5 a stationary piezoelectric motor pushing on the carriage such that the motor  
6 when energized moves with the carriage along the guide.

1 14. A tape drive, comprising:  
2 a take-up reel;  
3 a stationary guide;  
4 a carriage movable along the guide;  
5 a head carried by the carriage;  
6 a tape path extending past the head to the take-up reel;  
7 a piezoelectric motor attached to the carriage and pushing on the guide such  
8 that the motor when energized moves with the carriage along the guide; and  
9 an electronic controller configured to receive read and write instructions and  
10 data from a computer or other host device and to control operation of the take-up  
11 reel, the actuator and the head.

1 15. The tape drive of claim 14, wherein the controller is configured to  
2 position the head according to the following method:  
3 stopping the carriage at a known position;  
4 the motor moving the carriage a first step from the known position;  
5 counting the step;  
6 comparing the step count to a target step count;  
7 if the step count is less than the target step count, the motor moving the  
8 carriage another step; and  
9 repeating moving, counting and comparing until the step count is equal to the  
10 target step count.